

# Idaho Disease *Bulletin*

Zoonotic Disease Special Edition: West Nile Virus Update

Division of Health

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## West Nile Virus

West Nile virus (WNV) is not a pathogen that human or veterinary practitioners in the western United States have any experience diagnosing in their patients, but that may change next year. WNV was not found in the United States at all until the fall of 1999, when it was discovered in the greater New York City area. The mechanism of its introduction remains a mystery. WNV is making its way across the continental U.S. since its introduction (see graph, page 4) despite efforts to contain it. In this article you will learn about WNV ecology, including mechanisms of virus introduction, virus transmission, and virus maintenance. You will also learn about clinical characteristics of WNV in humans and veterinary species and the importance of animals as disease sentinels. Finally, information will be provided on reporting, sampling, and lab testing in Idaho, and whom to call or where to look for more information.

### .....What is the West Nile Virus?

West Nile virus is a zoonotic flavivirus, closely related to the widely distributed St. Louis encephalitis virus, which is already well-established throughout the U.S. WNV is maintained in nature in complex cycles involving mosquitoes and birds. Infection of incidental hosts, such as humans, horses, and susceptible bird species, usually occurs late in the summer and fall until mosquito feeding is hindered by the cold weather. WNV is typically introduced into new ecosystems by infected migratory birds and then maintained in those new ecosystems by resident mosquitos. There is no documented evidence of person-to-person or animal-to-person transmission of WNV. Because WNV is transmitted only by infectious mosquitoes, all animals and humans are exposed to the virus in the same manner.

Disease manifestations are most clearly described in humans, horses, and birds. The outcome of infection ranges from inapparent to fatal, with encephalitis or meningoencephalitis the leading concern.

West Nile virus was first isolated from a febrile woman in the West Nile District of Uganda in 1937. The outbreak potential of the virus wasn't recognized until 1957, when a large number of elderly patients in Israel suffered from severe meningoencephalitis. Epizootics of disease in horses have also occurred in such places as Morocco in 1996, Italy in 1998, France in 2000, and the United States in 1999-present. The virus is one of the most widespread flaviviruses in Africa, West Asia, Europe, and the Middle East, presumably due to the migration of infected birds from Northern Africa. The appearance of WNV in North America in 1999 may be an important milestone in the evolving history of this virus.

### .....Humans and WNV

Most human infections with WNV are subclinical; when illness does occur, manifestations tend to be more severe in the elderly. Onset of illness occurs 3-15 days post-infection. Most symptomatic infections are mild and include fever, head and body aches, sometimes with skin rash and swollen lymph glands. More severe infections may be marked by headache, high fever, stiff neck, altered mental status, tremors, convulsions, muscle weakness, paralysis, and death. Case-fatality rates (CFR) are highest in the elderly. Sixty-two cases were documented in the greater NYC area in 1999, 7 of them fatal (CFR=11%); 21 cases occurred in CT, NJ, and NY in 2000, 2 of them fatal (CFR=9%); and as of this printing, 15 human cases occurred in CT, MD, FL, GA, NJ, and NY in 2001, 1 of them fatal (CFR= 6.6%).

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## Mosquitoes

Although WNV has been isolated from numerous mosquito species, it is most commonly associated with the *Culex* mosquito. After feeding on an infected host, it is believed that mosquitoes pass the virus to their offspring during oviposition. The virus replicates in the salivary glands of the infected mosquito offspring, which then require a blood-meal when they mature. When the mosquitoes feed on a human or an animal, the virus is injected into the blood system of the host. The virus then multiplies and may or may not cause illness.

## Animals: Handling of Suspect Cases

Veterinarians should take normal precautions when caring for any animal suspected of having WNV or any other viral infection. There is no reason to destroy an animal just because it has been infected with WNV. Full recovery is likely. Treatment should be supportive and consistent with standard veterinary practices for animals infected with a viral agent. There is no evidence that a person can get WNV from handling a live or dead infected bird or mammal. However, persons should avoid bare-handed contact with any dead animal and use gloves or double plastic bags to pick up dead birds.

## Birds

Bird die-offs were an early indicator of a problem in the greater NYC area in 1999 and have been an early warning of WNV activity in subsequent years. Through September 2001, more than 70 species of birds have been positive for WNV, either by virus isolation or nucleic acid testing. All birds were located in the eastern United States, but that will change as the virus enters new ecosystems. Certain birds, particularly the Corvidae (crows, ravens, and jays) are very sensitive to WNV infection. In fact, the predominant bird affected so far in the U.S. has been the American crow. Magpies are corvids; therefore, it is possible that magpie die-offs could occur if WNV makes it to Idaho.

Clinical signs in birds may include ataxia, tremors, abnormal head posture, convulsions, uncoordinated gait, inability to stand, impaired vision, general weakness,

and resting on the keel bone. Differential diagnoses include Newcastle disease, avian influenza, fowl cholera, fungal infections of the brain, and vitamin deficiencies.

In 1999, 194 birds were found to be WNV positive including Anseriformes (mallard), Falconiformes (eagle, hawks, and kestrel), Ciconiiformes (black-crowned night heron), Gruiformes (sandhill crane), Charadriiformes (gulls), Columbiformes (rock dove), Coraciiformes (kingfisher), and Passeriformes (crow, jay, and robin). In 2000 a total of 4,323 birds were WNV-positive in 12 states plus the District of Columbia, represented by even more species. As of this printing, 10 states have reported WNV-positive birds for the first time ever in 2001: Florida, Louisiana, Wisconsin, Georgia, Indiana, Illinois, Michigan, Iowa, Tennessee, and Ohio. A more detailed summary of positive birds can be found at the following web-address: <http://www.aphis.usda.gov/vs/ep/WNV/summary.html>.

## Dogs and Cats

Domestic animals (dogs and cats) are not considered sentinels for WNV. There has been very little disease described in these species. WNV was isolated from one cat in NJ in 1999 and two cats in upstate NY in 2000. All were severely ill and died. WNV was discovered after rabies was ruled out. A 1999 seroprevalance study was carried out in Queens, NY, the apparent epicenter of WNV in the U.S. at that time. Up to 11% of dogs tested had been exposed to WNV, though none appeared clinically ill. Pets with neurologic disease should be first evaluated for other more likely causes of illness, including rabies, prior to WNV testing.

## Horses

Unfortunately, horses have proven to function as sentinels of WNV activity. Horse and human cases were occurring at approximately the same time during the 1999 outbreak in NY. Clinical signs in horses may include ataxia or at least two of the following: circling, hind limb weakness, inability to stand, multiple limb paralysis, proprioceptive deficits, blindness, lip droop/paralysis, muscle fasciculation, teeth grinding, or acute death. These signs of disease may be indistinguishable from those produced by other equine infections including rabies, equine herpes virus-1, equine protozoal myeloencephalitis, and eastern, western, or Venezuelan equine encephalomyelitis.

Based on available data, 25 horses were ill in 1999;

60 horses were ill in 2000 [37 (62%) survived and 23 (38%) died or were euthanized]; and 23 cases, as of August 11, have been found in 2001 with 7 deaths. No transmission of WNV has been documented from horses, either directly or through mosquitoes, to any other species.

**\*\*\*A conditional license for a new equine vaccine against WNV infection in horses has been issued by the U.S. Department of Agriculture. Limited distribution of vaccine is possible to horses on the east coast this mosquito season.\*\*\***

### **Zoo Animals**

A national "Protocol for the Surveillance for West Nile Virus in Zoological Institutions" was developed in 2001. If you are involved with zoo collections and have questions regarding testing of ill or deceased animals, call Dr. Mark Drew, State Wildlife Veterinarian, Idaho Department of Fish and Game, at 208-327-7070 or Dr. Leslie Tengelsen, Deputy State Epidemiologist, Idaho Department of Health and Welfare, at 208-334-5939.

### **Other Vertebrates**

Since 1999, CDC has received reports of WNV in bats, cows, donkeys, gerbils, goats, pigs, shrews, frogs, chipmunks, raccoons, skunks, squirrels, and domestic rabbits. These instances are rare.

## **\* What You Can Do \***

### **Reporting, Sampling and Shipping**

Veterinary practitioners and wildlife professionals will play a key role in WNV surveillance. The first sign of WNV in Idaho may be the detection of sentinel disease in birds, horses, or other wildlife. The Bureau of Laboratories staff have received special training, instrumentation, and reagents to provide state-of-the-art WNV testing, here in Idaho. All testing activities have been developed in a coordinated fashion with Department of Agriculture and Department of Fish and Game professionals to provide centralized testing and data collection.

**Reporting and Sampling Suspected Horses:** Reporting of suspected neurologic horse cases to the Department of Agriculture is critical to early detection. Any neurologic horse should be evaluated for rabies as well. With early WNV detection, public health interventions may be initiated. Call Dr. Kendal Eyre for reporting purposes at 208-332-8540. The location of the

premises (county and closest city), clinical signs observed/reported, date of onset, age of animal, outcome (alive/died/euthanized), recent travel history, and vaccination status will be discussed.

### ***Antemortem Sample Collection from Horses:***

Collect a serum sample in a 10 ml red-top tube or clot-separator tube. Cerebrospinal fluid (CSF), if available, should be collected in a red-top tube labeled with the site of collection (e.g., cervical or lumbosacral).

### ***Postmortem Sample Collection from Horses:***

Recommendations for conducting necropsies of suspected WNV cases can be found at <http://www.aphis.usda.gov/oa/wnv/wnvguide.html>. If available, the following samples should be collected in priority order listed and sent to the Bureau of Laboratories:

1. Fresh brain tissue for rabies and WNV testing
2. CSF (indicate collection site, e.g., cervical or lumbosacral)
3. Fresh and fixed spinal cord segments (cervical, thoracic, and lumbar).

### **Reporting and Sampling Suspected Birds:**

Reporting dead bird sightings is very important to help the Department of Health and Welfare and the Department of Fish and Game determine if WNV is present in Idaho.

***Reporting Dead Birds:*** With WNV infection, birds may die in groups or individually. Dead bird sightings, particularly crows, ravens, jays, and magpies can be reported to the Department of Fish and Game at 208-327-7070. They will request the following information: type of bird(s) if known, number of dead birds, and the location of the dead birds (county and closest city).

***Sampling Dead Birds:*** Not all bird die-offs are due to WNV infection. While every report is important to our monitoring efforts, not all birds reported will be tested for WNV infection. A representative sample of birds will be evaluated to determine the presence of virus in a particular locale. Call Dr. Mark Drew, Department of Fish and Game, at 208-327-7070 to clarify packaging and shipping procedures. The entire bird will be evaluated. No necropsy is required by you or your staff.

### **Wildlife Reporting and Testing:**

Call Dr. Mark Drew, Department of Fish and Game, for further information on reporting and sampling wild animals and wildlife.

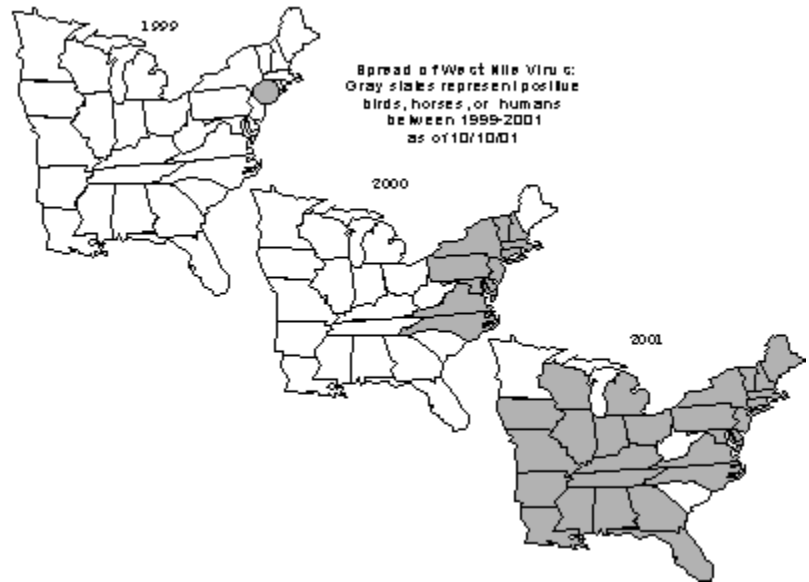
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To learn more about West Nile virus, links to fact sheets can be found at [www.idahohealth.org](http://www.idahohealth.org), under **epidemiology, West Nile Virus.** or <http://www.aphis.usda.gov/oa/wnv/> or <http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>

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